The Right Angle

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Vol. 8 OCTOBER, 1924 No. 2

Fire Prevention Week
Oct. 5-11, 1924

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THE results of years of waterproofing research and practice are packed—ready for use—into the new GF Waterproofing Handbook. It is filled with working drawings, methods, specifications, photographs and tables, under the following main divisions:

Sub-Structural Waterproofing—foundations, basements, pits, tanks, pools, containers and other structures subjected to hydrostatic pressure or dampness.

Super-Structural Waterproofing—proofing walls against weathering and dampness, stain-proofing cut stone, preserving and beautifying stucco, brick and concrete walls and filling expansion joints.

Cement and Wood Floor Preservation—hardening, dustproofing, decorating and waterproofing cement and wood floors—accelerating the setting and preventing freezing of newly laid cement floors.

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The RIGHT ANGLE
"Let's get the Right Slant on this proposition!"

VOL. 8 OCTOBER, 1924 NO. 2

Defeating *the* Fire Demon *with* Metal Lath

NOTE:—*Today we require a "fireproof" building to house our business or industry. We favor the "fireproof" hotel or apartment. Disaster has edueated us. But what makes a building "fireproof?" This article, will tell you.*

By W. B. Turner
The General Fireproofing Company

At the left is the house of a fisherman, at Santos, Brazil. Note the lath and plaster construction of the primitive hut and contrast it with the attractive residence shown at the right. Metal lath was used in the construction of the modern dwelling.

A COMPARATIVELY new art based on economics and public safety has been created in American architecture. It is called fireproofing and it is classified rightly as an art because in utilizing it, the builder-artisan makes it embrace beauty, endurance and strength.

When buildings were erected merely as a shelter for a few persons, fireproofing was not regarded as essential as a construction factor. But with quantity production of iron and steel and the consequent enormous increase in commerce, industry and great centralization in offices and homes, the problem of fire protection became acute. A cigaret carelessly dropped in a waste basket might, and did, turn great buildings into monster torches. Then men turned to iron and steel and with it solved the defects in those things they had created from it.

There are few cities of importance in the world that have not been taught the lesson that is written by fire. London, Paris, Moscow and others, in their beginning, are among them. All, at some time or other, were destroyed or nearly destroyed because their builders failed to provide fire protection. Nero might have been an obscure figure in history if the modern art of fireproofing had been known to Roman architects.

New York, in its days of rambling frame houses went through the terror. So did Chicago, though it might not have been by the grace of Mrs. O'Leary's cow. And by the same fate San Francisco is now a city of fire-resisting iron, steel and stone. Tokio, with its millions of flimsy though romantic dwellings and narrow streets endangered Japan's place as a fourth world power when it burned recently.

While this destructive demon that makes no exception of women and children was striking these mighty blows, his torch did not spare many lesser, if no less famous, places. Scarcely two years ago, row after row of pretty summer bungalows on Long Island were swept away, and, only recently, beautiful Berkeley, one

No protection against fire. This plastered wall of a building costing $8,000, is a typical example of wooden lath construction.

of the finest residential suburbs of San Francisco, was all but wiped out.

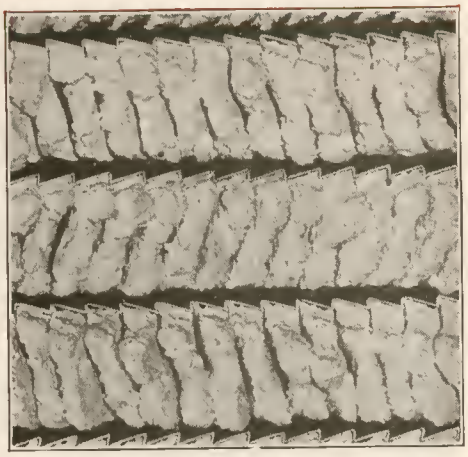
As in other great movements, solution of the problem as well as the approach to the ideal, was slow. Compositions of stone, steel and iron went through the evolutions that are common knowledge to the contractor and workman. Part of them were fireproof, but not sound-proof, and many of them did not serve for a city beautiful.

Today there are six types of home construction in more or less common use. These are stone, tile, brick, frame, concrete and stucco. Stone was one of the first types of building materials. Expense of transportation deducted from its popularity in regions away from its immediate source. Solid stone walls plastered direct are apt to "sweat," making interiors damp and gloomy. Sometimes this can be overcome by leaving air space between the plaster and wall.

Brick is popular for large office or factory buildings because of its strength, endurance and, when properly reinforced against hazard, makes the building practically fireproof. Its first cost, however, makes it prohibitive in many homes. Concrete is popular in some regions, its tendency to create water seepage, being easily overcome if handled properly with efficient workmanship. The frame building has until recently been less expensive than any of these three types mentioned, and that is undoubtedly the reason for its popularity. By "less expensive" it is meant that the first cost is less. When decay, upkeep and fire menace are considered the cost is not so small. Records show that the first fifteen minutes after fire breaks out determine the fate of the building. If materials are such that resist flames the firemen have a chance to keep the damage at the minimum.

An ordinary frame building once ignited becomes a torch, destroying itself as well as endangering surrounding dwellings. Some cities that have learned the lesson of fire prevention prohibit all-wood houses.

All these types of construction have served, however, as an approach that has led to a nearer one to the ideal—the stucco home. Stucco construction is growing more and more in popularity because of its medium cost, beauty of finish in the protected wood frame construction and low maintenance expense. Properly erected, it combines economy, durability, gracefulness and safety.



Reinforcement of plaster by strands of Herringbone Metal Lath. Contrast this fireproof wall with the picture at the left.

Stucco buildings were created and made possible in their present-day types by the perfection of metal lath. On both inside and outside walls the lath is placed on wooden studs. Inside, the plastering goes on the metal, while outside, cement stucco is put on in artistic ways, similarly, in principle, to the plastering inside. Thus wooden lath has become obsolete.

One of the most successful metal laths for stucco homes—either millionaires' villas, or inexpensive cottages—is known as Herringbone metal lath, a product of the General Fireproofing Company. It has nothing in common with the design or service of the wooden product but is a fabric of metal mesh work cut and

During a test recently conducted by the General Fireproofing Company, to demonstrate the fire-resistance of a building constructed of Herringbone Metal Lath, the above photographs were taken. The all-wood half of the building was quickly consumed by the flames.

These photographs show a small stucco residence, in the construction of which Herringbone Lath was employed. At the left may be seen the unplastered walls of metal lath; at the right is shown the completed structure.

expanded from a single sheet of steel or "Armco" ingot iron, the latter having been chosen as a material that would give sufficient strength and resist rust from contact with wet plaster and concrete composition.

The Herringbone lath has in its make-up longitudinal ribs set at an angle of 45 degrees with flattened cross strands. Its rigidity makes it easy to handle, prevents sagging between supports and allows supports to be placed as much as 25 per cent wider apart than in conventional construction work.

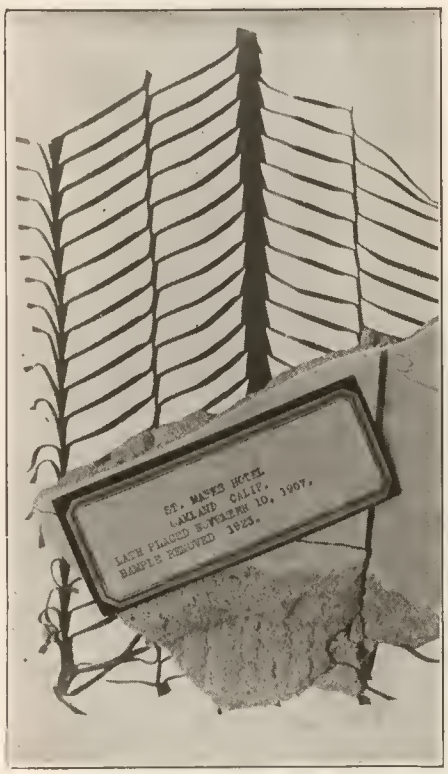
The ribs act as shelves in holding the mortar. The cross strands allow the plaster to curl behind the lath, completely covering it. This acts as a "key" in holding the material firmly and securely in place. Only slight end laps are necessary to afford the strength to hold even the heavy outer stucco concrete in place.

The ribs are slanting, allowing the plaster to key as securely at studs as elsewhere. Accompanying pictures show the possibility of beauty and grace in homes of which it is a part.

The use of this lath, in fireproofing for beauty and endurance, is not confined to homes, however. It is successfully used in the walls of the world's largest buildings, including the Woolworth and Municipal buildings of New York. The imposing "Pennsylvania Terminal" of New York is also fireproofed with "Herringbone." Metal lath is also used in the beautiful Beverly Hotel, Los Angeles, and the Copeley Plaza Hotel, Boston.

In apartment buildings, especially, does it perform a mission of safety and strength. Here where hundreds, sometimes thousands, of persons are living under the same roof, the menace of fire, if not properly guarded, is ever present, and in this connection the story of Harry Wardman, is most interesting.

Wardman has financed and built more than 250 apartment houses and 5,000 homes in Washington, D. C., at a cost of more than $50,000,000. His problem in erecting these buildings that are the homes of some 40,000 Washingtonians was durability, attractiveness and fireproofing. Some of the apartments he has built are of concrete, others are of brick and some of structural steel.



Herringbone Lath made of rust-resisting "Armco" ingot iron. Here is a specimen from St. Marks Hotel, Oakland, Calif., uncorroded after 16 years of service.

Throughout these buildings, however, he uses Herringbone metal lath. He declared, in a statement, that Herringbone solid partitions can be built for much less money than any other type of fire-resisting partitions and ceilings; they afford more floor space, weigh less, thereby saving on foundations and framing; they afford fire protection at a minimum cost, prevent plaster cracks and are sound-proof. Some of the Washington apartments so built include the Bedford, Northbrook and Southbrook Courts, Somerset House, Clifton Terrace, and the Wardman Park Apartment Hotel. One hundred and fifty thousand yards of "Herringbone" was used in the Wardman Park Hotel, the economy being one of the factors that allows a rate of $30 per month room rental in this, one of the world's finest hotels.

Just how much fire protection is afforded by plastered walls and ceilings on metal lath supported by wooden framing was a subject of considerable discussion when the lath was first introduced.

This, however, was settled in a series of tests conducted by the Underwriters Laboratories, as the result of which such construction was given a one-hour rating. This means that the Underwriters Laboratories found that it will take more than one hour for the flames to eat through a partition protected by metal lath and gypsum plaster.

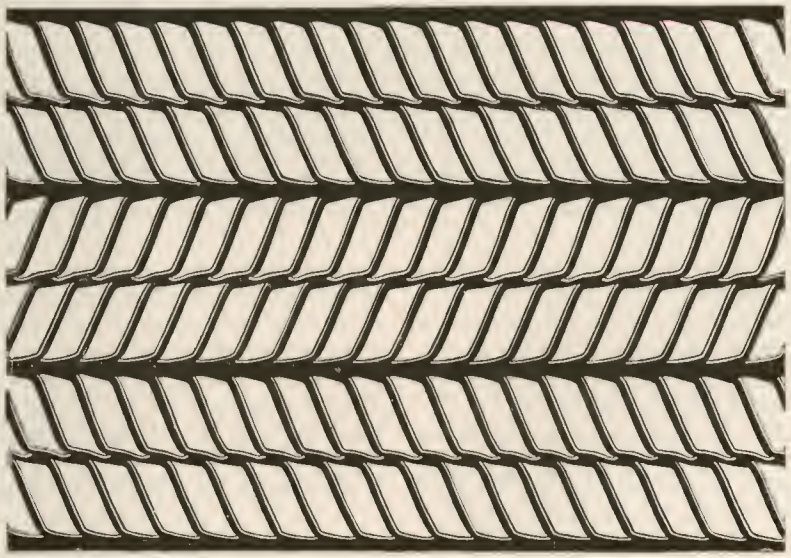
rringbone Doublemesh Lath

General Fireproofing Company's New Plaster-Saving Metal Lath

THE General Fireproofing Company announce their new metal lath which will be known as Herringbone Doublemesh.

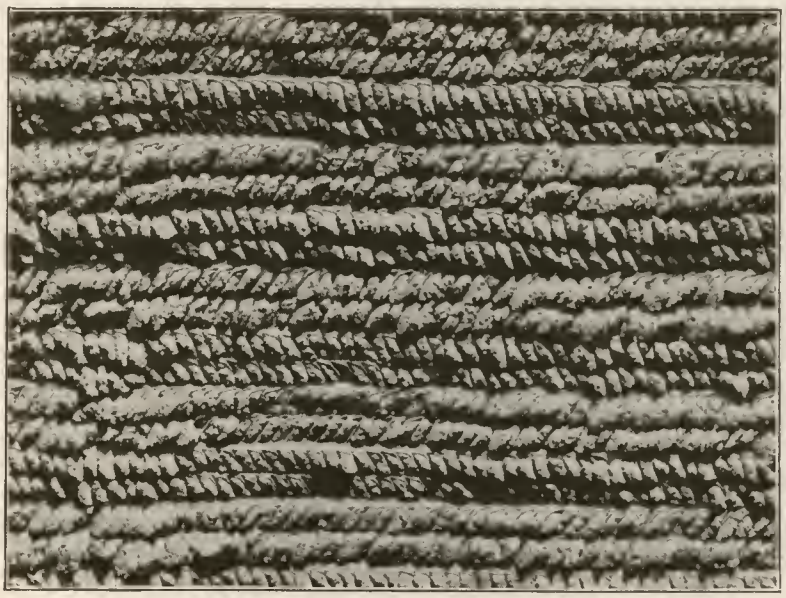
Herringbone Doublemesh Lath has all the advantages of the older types of Herringbone, namely, rigidity, easy erection, economy in lapping, plaster-saving mesh, fire and crack prevention plus a smaller size mesh.

"Doublemesh" means that this new Herringbone lath has double the number of openings of older style of Herringbone. That means the size of each individual opening is reduced approximately one-half. But that is not the whole story. The opening of Herringbone Doublemesh lath is smaller than any other expanded metal lath made. This means that there are smaller holes to fill up with plaster, less plaster for scratch coat and more of the plaster surface actually backed up by the "key."



New Herringbone Doublemesh Metal Lath. Actual size of mesh.

With the introduction of Herringbone Doublemesh Lath the way is opened to a more general use of metal lath in dwelling houses and other wood joisted structures. It places metal lath and plaster with all its proven advantages of fire protection and crack elimination within reach of the home builder with limited means.



Herringbone Doublemesh Lath, showing "Key."

Everyone wants walls that do not crack or show lath streaks and most of them are able to afford the slight additional cost, particularly so when they once realize that the addition in cost really amounts to less than the first year's depreciation due to plaster cracks.

When Herringbone Doublemesh Lath is plastered on half-inch grounds the same ⅜" plaster covering is given the lath but with the addition of 100% keyed and steel reinforced surface. This is only one source of economy in the use of Herringbone Doublemesh Lath.

Another source of economy is the time and labor saved in plastering. Since Herringbone Doublemesh Lath requires so little plaster for the scratch coat, the result is quicker setting. In most cases the plasterer can follow right back with the brown coat without moving his scaffolding.

A sample of the new Herringbone Doublemesh lath will be sent to any architect or builder interested.

DATA SHEET..

OCTOBER, 1924

The GENERAL FIREPROOFING COMPANY
YOUNGSTOWN, OHIO.

ON this page and the following three pag
data that will be of value to the arch
neer and contractor.

Tear these pages out and file them for refere f there is any information you require on fireproofing co struction or waterproofing our engineers are at your service and will be pleased to send you details gratis.

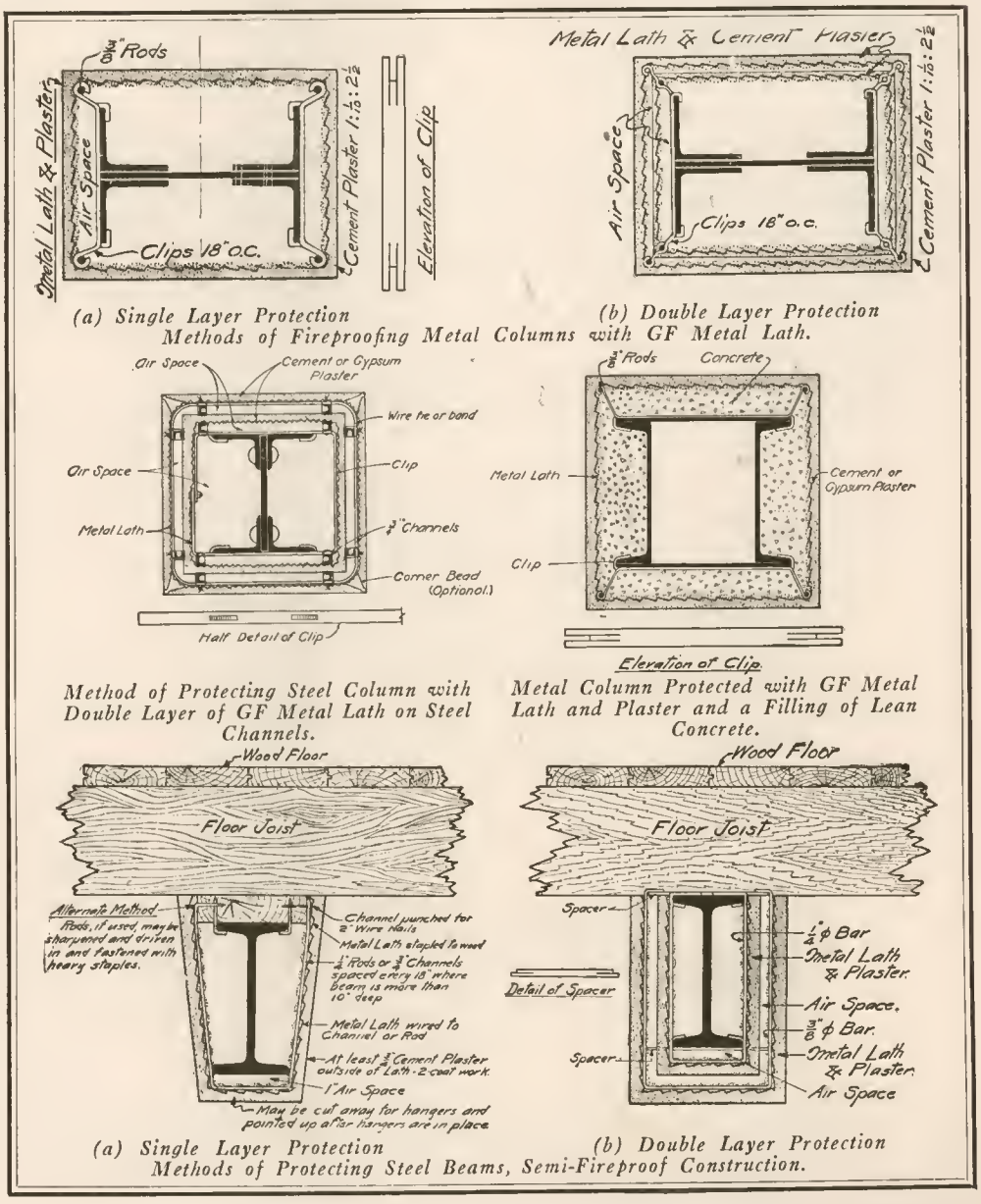
Fireproofing Beams *and* Columns

THE necessity for the protection of supporting columns, beams and girders has been demonstrated in many severe fires and is recognized by every architect and engineer. In designing a modern structural steel building it is no longer sufficient to provide merely for loads and stresses. The structural members must also be provided with the endurance to withstand the terrific heat generated from fires in neighboring buildings or among the inflammable contents of the building itself. They must be so insulated that they will not weaken and will continue to support their loads without failure. While steel structural members will not be consumed, they are greatly weakened when exposed to heat in excess of 700 degrees with disastrous results to the entire structure.

Fireproofing Steel and Iron Columns

It is readily apparent that those members which carry the floors should by all means be fireproofed. If these are weakened or destroyed there can be but little hope for the rest of the building, or its contents.

The superiority of metal lath as a reinforcement for the protective covering for structural members was demonstrated again and again in the San Francisco and Baltimore fires. The rapid collapse of many so-called fireproof buildings clearly showed the lack of durable column protection. Many of them although built of incombustible materials, suffered most severely where the heat had gained direct access to the steel sup-

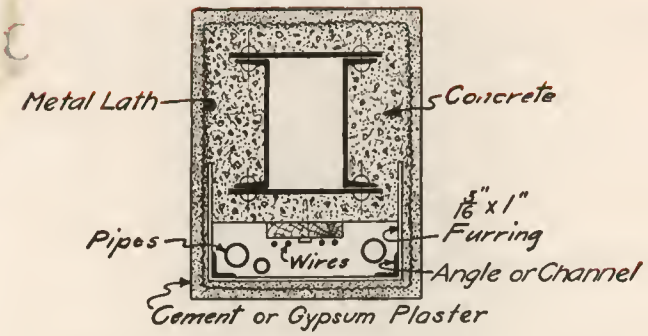


(a) Single Layer Protection (b) Double Layer Protection
Methods of Fireproofing Metal Columns with GF Metal Lath.

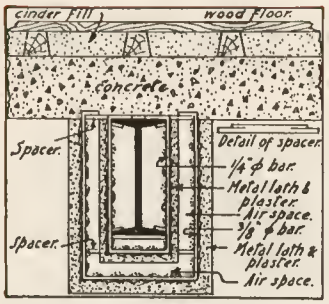
Method of Protecting Steel Column with Double Layer of GF Metal Lath on Steel Channels.

Metal Column Protected with GF Metal Lath and Plaster and a Filling of Lean Concrete.

(a) Single Layer Protection (b) Double Layer Protection
Methods of Protecting Steel Beams, Semi-Fireproof Construction.



Protection of Structural Steel Column with Metal Lath and Plaster with Provision for Pipe Chase.



Method of Protecting Steel Beams with Double Layer of Metal Lath and Plaster, Fireproof Construction.

porting members. In contrast to this, wherever metal lath and concrete were used, the protection remained intact affording full protection to the steel.

Where a single thickness of metal lath and plaster is used, and is supported on steel furring, ample protection is given for the normal exposure typical of fires in office buildings, hotels and similar structures. The use of a double layer of metal lath and plaster is recommended for the more severe exposures.

Fireproofing Steel Beams and Girders

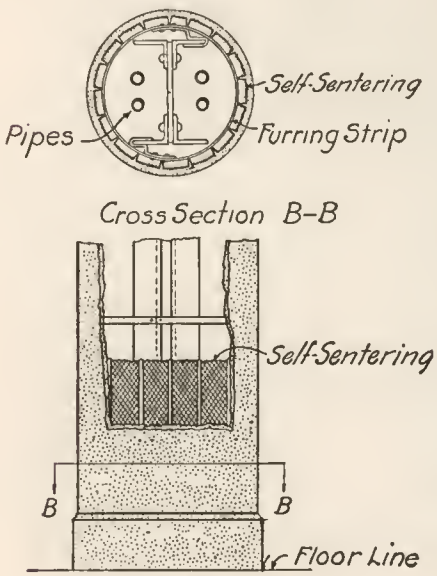
Second only in importance to the columns, from a fireproofing standpoint, are the beams and girders, and much of what has been said concerning the necessity of protecting columns is equally true of beams.

The methods for fireproofing beams and girders are similar to those employed for the veritcal members. Both single and double layers of metal lath and cement are used. Details are shown in the accompanying sketches. GF Steel Channels are used extensively for furring in the fireproofing of beams and columns.

Different methods of employing Herringbone and GF Key metal lath for the protection of beams and columns are shown in the accompanying detail sketches.

Self-Sentering *for* Beam *and* Column Protection

IN the protection of steel columns and beams, Self-Sentering is particularly adaptable. The ribs are placed against the structural members and act as furring while the mesh or connecting fabric permits formation to the required outline and at the same time forms a perfect plastering surface.

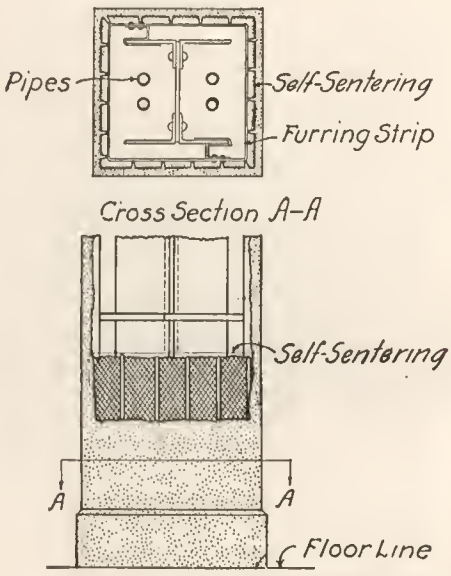


Self-Sentering Column Protection Round Columns.

For posts and false columns, Self-Sentering can be folded to the desired shape, stood on end, secured in place and plastered without other supports. This shell can then be filled with concrete after scratch coat is applied.

For false beam construction, the only framing required is the brackets to give the desired shape. Self-Sentering takes the place of both lath and furring. The heavy, closely spaced ribs give ample strength for the heavy plaster load usually required and the perfect flexibility of Self-Sentering permits shaping to conform to the necessary curves and angles without danger of fracturing the metal.

Self-Sentering is always furnished with a coating of baked-on enamel to protect it before and after it is placed on the job. This protective coating in no way weakens the bond between steel and concrete as the mesh work of Self-Sentering gives a mechanical bond greatly in excess of that actually needed.



Self-Sentering Column Protection Square Columns.

The Integral Method *of* Waterproofing

BY the integral method of waterproofing concrete or cement work a material is introduced into the mixture that renders the work, when set up, impervious to water.

Integral waterproofing is done in two ways, either by incorporating the waterproofing agent into the concrete or cement work at the time of pouring or by applying it in the form of a waterproofed Portland cement plaster coat finish to the surfaces of walls and floors.

The first method is applicable only to new work; the second to new work or to old construction when leaks have developed.

In the integral method of waterproofing it is essential that, the concrete itself, or, in the case of Portland cement plaster finish, the construction to which it is applied, shall have sufficient structural strength to resist the hydrostatic pressure to which it will be subjected in service. Integrally waterproofed walls or floors should be considered as floor arches to carry a load equivalent to the weight of the actual or anticipated waterpressure they will have to withstand, except that the dead weight of the concrete itself is taken into consideration in offsetting the weight or pressure of water. In these cases the reinforcing bars, when required, are placed within 2″ of the face of the work opposite to that on which the water pressure will be exerted. In the case of wide spans the cost of the concrete and reinforcement will be reduced if inverted reinforced concrete beams are placed at intervals.

A ready method of determining the necessary thickness of concrete required to withstand a given waterpressure is to divide the depth or height of the water above the underside of the floor slab, in inches, by 2.3, which will give, in inches, the requisite thickness of concrete. In cases where this shows more than 12″ of concrete to be necessary it is more economical to use reinforced concrete.

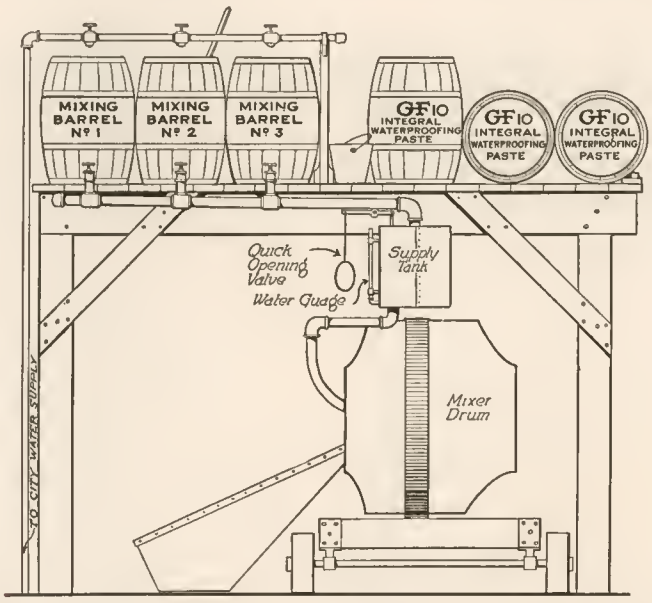
In designing walls to resist great waterpressure, as in reservoirs, etc., each foot in height should be designed to resist the waterpressure at that level. The lowest 12″ of wall naturally has to resist a greater pressure, that is, carry a heavier load, than the 12″ immediately above it and so on to the top. If the average of the pressure at the top of the wall and of that at the bottom is taken as a basis, the lower half will be insufficiently reinforced and there will be excessive reinforcement in the upper half.

Waterproofing of concrete and cement work, whether above or below grade, is, in all cases, essential to the preservation of both the appearance and the durability of the construction. It is quite generally accepted that waterproofing is necessary in work below grade which may, at any time, become subjected to hydrostatic pressure, but the fact is almost universally overlooked, that exposed concrete and cement work above grade are almost equally subject to damage by rain and frost. Rainwater saturating the surface and freezing causes small cracks and spalls. These dr more water which, in turn, ez and enlarges the cracks and sp s that gradually the entire face c tl work becomes cracked and br en eventually pieces fall away and the appearance of the whole wor is ruined. Integral waterproofing, a the cost of the material alone, wil entirely prevent this without changing the finished appearance or character of the work.

GF Integral Waterproofing Paste (GF 10)

GF Waterproofing Paste (GF 10) is an ammonium stearate paste of the consistency of soft butter. It is easily soluble in, and of the same specific gravity as water.

GF 10 combines with the lime, released by the cement, in setting, thereby forming calcium stearate which is water repellant. On evaporation of the excess water, the pores of the concrete or cement work are left with a premanent water repellant lining that effectively prevents the entrance of more water.



Method of mixing where a mixer with water attachment is used. GF 10 is mixed with the gauging water in barrels Nos. 1, 2 and 3, in the proper proportions. The barrels are filled and emptied in rotation by means of the valves in the supply pipes. This gives a continuous supply of treated water without interruption.

Investigations by Professor Duff Abrams of the Lewis Institute of Chicago show that water, in concrete and cement work, performs two functions. First, it combines chemically with the Portland cement to harden it. Second, it acts as a vehicle or lubricant to flush the particles of aggregates into place. It requires less water for hardening than for flushing, so that the excess water for the latter purpose weakens the mass by its tendency to form pockets, and evaporating, leaves the mass porous.

GF 10 in addition to combining with the lime of the cement greatly increases the lubricating qualities of the water by breaking down the skin tension. By increasing the lubricating efficiency of the water it reduces the quantity necessary to obtain easy flowing, workable concrete, at the same time making the mass denser and consequently stronger.

A cubic foot of concrete waterproofed with GF 10 weighs 151½ lbs., an increase in weight, or density, of about 5% over unwaterproofed concrete.

The simplest methods for obtaining the proper proportions of GF 10 and water are—

(A) For Mass Concrete

One gallon (8 lb.) of GF 10 to 34 gallons of water. Into a 50 gallon barrel put 1½ gallons (12 lbs.) of GF 10, fill up with water and stir until it looks like a mixture of milk and water.

(B) For Cement Plaster, Floor Topping, Stucco or Cement Mortar—

One gallon (8 lbs.) of GF 10 to 17 gallons of water. Put 3 gallons (24 lbs.) of GF 10 into a 50 gallon barrel, then fill with water and stir as above.

(C) For Cement Blocks, Tiles, Artificial Stone

Determine the quantity of water to be used per bag of cement and make the solution of GF 10 and water on the basis of 1⅓ lbs. of GF 10 for each bag of cement.

(D) For a Mixer with Water Attachment—

(1) If the water is supplied through a tank on top of the mixer, put 1 or more 50 gallon barrels on a platform slightly elevated above the top of the tank on the mixer, connect the water line to these barrels instead of to the tank and connect each barrel with a valve to the mixer tank. Make the solution of GF 10 and water in these barrels as described above and keep the mixer tank filled from the barrels.

(2) If the water is supplied directly to the mixer, make a barrel full of solution in the proportion of 1 gallon (8 lbs.) of GF 10 to each 5 gallons of water stirred as before directed. Put into the mixer 1 gallon of this solution for each bag of cement used in the batch and then immediately let in enough water to bring the batch to the usual consistency.

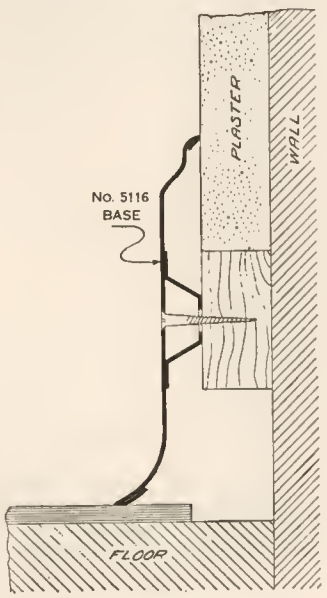
Note: These two methods are applicable for either mass concrete, cement plaster, floor finish, stucco or mortar.

In some cases, as for instance in artificial stone and cement work where the least possible quantity of water is used, or in localities where the water contains lime carbonate and alkalies which will turn the GF 10 into calcium stearate before it comes in contact with the cement, thereby making it insoluble, it is preferable to use a waterproofing medium in the form of a powder to be first mixed dry with the cement.

A Removable Steel Base Board

THE GF No. 5116 Removable Steel Base pictured here makes an ideal finish between the floor and side walls of hospitals, hotels, office and apartment buildings.

Where the floor is covered by carpet or linoleum it enables the floor covering to be placed with all edges concealed. The smooth surface, finished to harmonize with the room and the curved shape of the base enable the same to be easily kept clean and free from dust. Where the wall is to be later papered or painted the easily removed base enables the workman to do a better job in much less time than is required where the base board cannot be removed. The sanitary feature of this GF Base recommends it highly for hospital work.



This base is attached to wooden plaster grounds such as GF Peds and is placed in position after the plastering and flooring are in. It is equipped with a continuous metal backing strip giving it an even and firm support at the point of attachment.

This base is supplied as follows:

Height	Length	Weight per 1000 ft. Crated
4″	10′	875 lbs.
6″	10′	1080 lbs.

The exposed surface of the base is coated with a special primer which gives a flat finish suitable for any type of decorative work.

VOL. 7 OCT. 1924 NO. 2

THE RIGHT ANGLE

Published by
THE GENERAL FIREPROOFING COMPANY
Youngstown, Ohio

RIDDELL ELLIOTT, EDITOR

EVERY day in this country fire devours valuable property. Millions of dollars worth of buildings every year go up in smoke. And the pity of it all is, many of the fires could be prevented.

Negligence is the advance guard of calamity. Most fires are the result of carelessness. Negligence implies more than a lighted match thrown in a waste basket, or a cigarette tossed in a rubbish pile. Negligence is deeper rooted than this. Neglect to make a building fire-resistive at its conception is negligence.

Whoever is to blame, the result is the same. Daily the fire fiend reaps his terrible harvest of life and property. And this sacrifice is made year in and year out because of somebody's negligence.

We do not mean that all fires are the result of negligence. There are fires that are accidental, fires beyond the power of man to prevent. But the majority can be prevented.

What is needed is fire-safe construction. Let us build our homes, our business buildings, our public institutions from materials that fire cannot destroy. In this way we can defeat fire. We can cheat him of his prey.

* * *

WITH cold weather only two or three months away it is well to give consideration at this time to ways and means of preventing the customary winter slump in building activities. The winter of 1923-24 was a record breaking season for winter construction, due largely to the determination of many builders to develop methods of keeping their construction work going ahead in spite of adverse weather.

Average figures show that carpenters work eight months a year, and painters even less. Other branches of the building industry show similar figures.

While the framing of buildings cannot be carried on as economically in cold weather as in the summer months, there is much of the work that can progress with summer regularity. This applies particularly to concrete work such as the laying of foundations and floors. Hundreds of contractors last winter adopted the method of protecting their concrete from freezing by the use of GF Cement Accelerator and Frost Preventive (GF 12) with the result that Spring found them with their work well along toward completion.

This inexpensive material added to the mixing water not only lowers the freezing point of concrete but also quickens the setting of the cement to the point where all danger of frost is quickly over, even in the case of an abnormal drop in temperature.

* * *

A NUMBER of cities have requirements in their building codes which make it necessary for residences to be placed a certain distance from the lot lines. This immediately affects the available area which the building can occupy.

It is interesting to note that while the brick walls on an average residence, even where an 8″ thickness is permissible (this is unusual for many building codes), are 9½″ in actual thickness, the total thickness including the inside plaster and the outside stucco on a back-plastered stucco wall is only 6¼″. Builders using the back-plastered type, therefore, have a net saving of 3¼″ in the wall thickness, which necessarily is true in all exterior walls of the house on both floors.

With the limitations mentioned above regarding allowable space which may be occupied by the building, this saving in wall thickness is of interest to the prospective home owner. In an average two-story residence whose dimensions are 20 x 30′, this saving in floor space amounts to 54 sq. ft. or 486 cu. ft. This space is sufficient for any one of the following:

Breakfast Room
Sewing Room
Child's Bed-room
Spare Room
Dressing Room
Extra Bathroom
Three large Clothes Closets,

or for many purposes which the average house-wife can quickly discover. It means just so much more available floor area which otherwise goes to waste, and practically adds another room to the house. In dollars and cents 486 cu. ft. at a fair average of 40c means about $200.

* * *

Metal lath cannot be seen when the job is completed, but its good results are always visible.

* * *

There is no such a thing as an absolutely "fireproof" building. A building can be made fire-safe, that is, capable of retarding fire long enough to give the fire department time to extinguish it.

* * *

The skyscraper is an American product. In no other country are buildings built so high. Structural steel construction made the skyscraper possible. Fire-resistive materials helps to make it a success. It would be fatal to build a skyscraper of combustible materials.

Fire Losses Exceed Income Tax

FIRE losses in the United States in 1922, totaling $506,541,001, exceeded by millions the amount of the nation's personal income tax receipts for the year, said a report by the National Board of Fire Underwriters.

The board held the careless smoker responsible for a toll of $25,776,951. Defective chimneys and flues caused the next greatest loss, $18,550,433. Fire originating in boilers, stoves and furnaces caused a $16,347,-684 loss; spontaneous combustion, $14,594,799; electricity, $11,918,572; sparks on the roofs, $11,075,719, and lightning, $11,513,725.

The recorded losses, the report explained, totalled $405,-232,801, the total for the year being reached with the addition of 25 per cent as representing unreported fires and those involving uninsured property.

Waterproofing *a* Swimming Pool *by the* Integral Method

THE new 1,500,000 gallon swimming pool constructed in Idora Park, Youngstown, Ohio, by the Heller-Murray Co. of that city was opened to the public on June 14th.

This pool, one of the largest of its kind in the country, is oval in shape with a long diameter of 210 ft. and a short diameter of 160 ft. When filled, the depth of the water will increase gradually from six inches at the outer edge to 10½ ft. at the center.

The pool is in the open air, exposed to the sunlight throughout the day, and will accommodate a maximum of 4,000 bathers at one time. A diving tower with two levels for low and high diving, rises from the center of the pool and can be reached only by the experienced swimmers. Safety lines and ornamental floats anchored to eye bolts set into the concrete floor of the pool will mark the safety limits for the inexperienced.

A building, which combines dressing rooms, filtration and purifying plant, a laundry and spectators' balcony extends around one-half the pool. Shower baths are placed at each entrance of the bath house and all bathers must pass under the shower before entering the pool.

The pool is fed by 26 two-inch water mains around the edge or by five six-inch mains in the bottom, the direction of flow being reversed at will. A complete change of water will be made every 20 hours. Water is supplied from the city water mains.

An elaborate system for maintaining purity of the water at all times has been worked out. This consists of a pressure filter system, including three pressure tanks each 18 ft. long by 8 ft. in diameter. An electrically driven pump having a capacity of 1,250 gal. per minute draws the water from the pool, forces it through the filters and returns it to the pool thoroughly purified. Circulation is maintained continuously while the pool is in use. By a unique arrangement of valves, the circulation of the water is reversed several times each day, entering at the bottom and overflowing at the top into a scum gutter which removes all surface impurities.

The filters are cleaned regularly by reversing the flow and washing the impurities into the sewer. The water as it returns from the filters to the pool will be subject to chemical and bacteriological tests and results of analysis will be posted at regular intervals.

One-half the pool rests on excavated area, the other half on filled ground. For this reason the concrete of the second half is reinforced. An interesting method of waterproofing the concrete of the floor was worked out by the contractors. The concrete is waterproofed by the integral method, a waterproofing paste supplied by the General Fireproofing Co., Youngstown, Ohio, being used.

This material was introduced into the mixing water supplied to each batch, resulting in a concrete floor thoroughly waterproofed throughout its mass.

Action of this material in waterproofing concrete is highly interesting. Effects of the waterproofing paste on the concrete are two-fold. First, it imparts to the mixing water a high lubricating property, thereby reducing the amount of water necessary to flush the particles into place, producing a dense concrete with pores of minimum size. Second, it forms a permanent and insoluble film over the surface of the remaining pores, making them water repellant.

The method by which the proper proportions of paste to water and cement were controlled is shown in an accompanying photograph. A platform slightly elevated above the mixer was built and on this two empty barrels placed, connected by a two-inch pipe to a measuring tank placed conveniently near the mixer drum and at a slightly higher level. The measuring tank was in turn connected to the water supply pipe leading from the mixer tank. Valves placed at the proper points controlled the flow of the waterproofing into the measuring tank and from the latter into the water supply line to the mixer.

The waterproofing paste was mixed in the barrels in the proportion of one gallon of the paste to five gallons of water. This was done by first putting eight gallons of the waterproofing paste in each barrel and filling up to a mark with water. The measurnig tank was kept filled and, as indicated by an attached water gauge, enough of this mixture was then let into the mixer to give one gallon of the waterproofing solution to each bag of cement used in the batch.

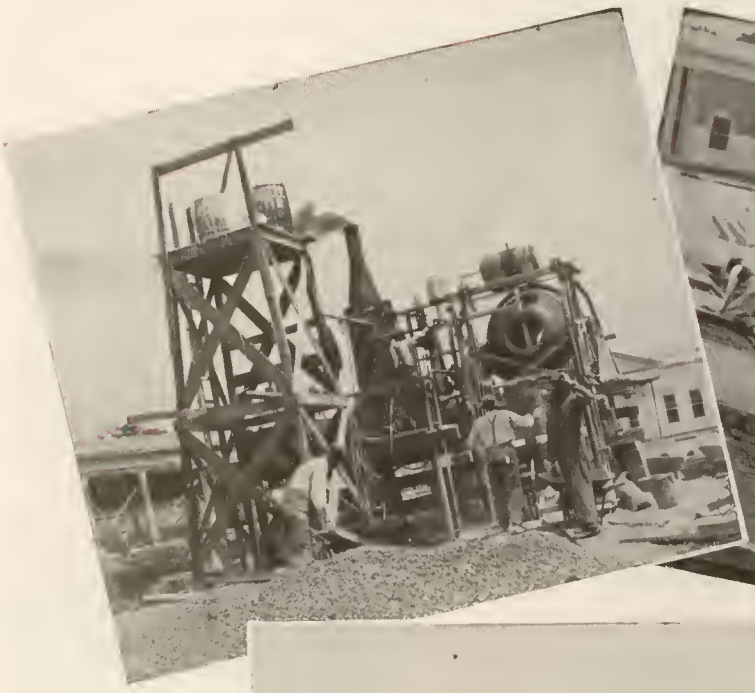
To be sure of the right proportions, the barrels were mixed and emptied in rotation. Each barrel of solution was sufficient to waterproof 8 1-3 yds. of concrete and the operation of preparing the solution required only about two hours per day of a helper's time, the remainder of his time being spent on the wheelbarrows. Thus the labor item involved was insignificant and the cost of waterproofing the job was confined practically to the cost of the waterproofing paste.

A unique feature of the operation was the method by which the concrete was transported to the point of use. A circular plank track was laid around the pool, and on this a Ford truck with a hopper carried the concrete wherever required. This eliminated the necessity for erecting a tower and chute and the mixer remained in one location throughout the operations.

The concrete was laid to a thickness of 6 in., in sections of convenient area for working, floated and trowelled. Joints between sections and all openings around pipes, etc., were made waterproof with a mastic waterproof cement furnished by the General Fireproofing Company.

Consulting engineers were Lynch Bros., New Haven, Conn. Engineers in charge of construction were E. P. Harrington and F. W. Stamboro of the Heller-Murray Company.

Natatorium *with* Concrete Bottom



Upper Left—Close-up of mixer showing method of mixing integral waterproofing paste with gauging water.

Upper Right — The concrete was poured, floated and trowelled in sections. Joints between sections were filled with a black, waterproof mastic cement.

Center — General view of Idora Park swimming pool, Youngstown, Ohio, under construction. Note position of mixer, truck and circular track for transporting concrete.

Bottom Photo — View of completed pool.

GF Products Used *in* Norway

Railway Station at Trondheim, Norway.

IF a product is meritorious it will get recognition anywhere. In far away Norway, where the climate is extremely cold in winter and excessively hot in summer, it has been found that GF Brick and Cement Coating (GF 101) gives entire satisfaction as an exterior waterproofing. The railway station at Trondheim, pictured above, is coated with GF 101 and the results have been in every way satisfactory.

Climatic conditions do not affect this waterproofing. It is efficacious in extreme heat or cold. GF 101 is thinner and tougher than linseed oil and therefore has better penetrative powers and greater durability, besides being unaffected by the alkalies contained in paint.

A Fire-Resistive Garage Built *with* Self-Sentering

THE fire hazard in a garage is perhaps greater than anywhere about the home. Gasoline is highly inflammable. There is always the possibility of fire wherever gas and oil are present. Rags become soaked, lie carelessly about and a cigarette or cigar butt may be the cause of a serious fire. It is for this and other reasons that garages should be built to resist fire.

An excellent method of building a fire-resistive garage is shown in the photograph below. This garage was constructed by Mr. P. F. Cunningham, of Oakland, California, and is simple to build. The foundation is concrete on which is built a framework of ordinary two by four studding. GF Self-Sentering is used for the walls and ceilings, being coated on both sides with cement plaster. While a garage of this type is not absolutely fireproof it is many times more fire-safe than the ordinary kind. Fire chiefs know the first few minutes of a fire are the most dangerous. A garage of this construction will hold a fire in check long enough to enable the fire department to reach the blaze and thus prevent a dangerous conflagration.

Sheets of Self-Sentering are 29 inches wide—the widest of any material made for a similar purpose. This means that the cost of placing Self-Sentering is reduced to a minimum. Every time a 12 foot sheet is applied 29 square feet of surface is covered. The number of laps is correspondingly decreased, with additional saving in labor.

To anyone interested in this type of garage construction GF engineers will gladly furnish full details, without charge. A post card is enclosed for your convenience.

The fire-resistive garage under construction, showing how GF Self-Sentering was used.

Lives Saved *by* Metal Lath

From the "Stockton Record," Stockton, California

IN connection with Stockton's fire prevention campaign, A. C. Horner, city building inspector, and Fire Chief M. D. Murphy were engaged in inspection work recently.

They inspected, among other places, the new Hotel Toyo, an Italian restaurant building at 22 East Market street, which was the scene of a blaze early Sunday morning which threatened to become serious, with buildings close up on all sides, but which was stopped after about $700 damage had been done.

All that saved the lives of roomers in the hotel, the building itself and surrounding buildings, and a possible conflagration, was the fact that a basement ceiling of metal lath kept the flames from spreading and an extra fire escape provided means of exit when the other fire escape was made useless by dense smoke.

Metal lath and plaster and extra fire escapes are being strenuously urged in the Stockton fire prevention campaign, and the fire Sunday is considered one of the best arguments for these fire precautions.

If metal lath had not checked the spread of the blaze Stockton might now be looking upon a vast area of blackened ruins.

These are arguments of the city building inspector and fire chief for the co-operation of the public in the fire prevention campaign they are pushing ahead.

A danger in the hotel fire was that the fire escape balconies were fourteen feet above the ground, whereas the present law requires that they should be nine feet from the ground, so that a person may hang and land safely with a short drop.

Nothing could have stopped Sunday's slight blaze from becoming serious if there had not been metal lath to check it, since it had been burning for two or three hours, it is thought, before a policeman discovered it.

Roofs—

Stronger, Lighter—and *Permanent!*

THE use of GF Self-Sentering gives the permanence—the fire protection—of concrete roofs, without the building of costly wooden forms. This is true for every type of roof; flat pitched, domed and saw-toothed.

Concrete roofs and floors built with Self-Sentering are lighter and have maximum strength. Slabs, since they are perfectly reinforced, need be but two inches thick, with a resulting saving in material and decreased dead weight.

USE THE POST CARD!

It will put you in touch with *your* service department in *our* plant.

It is here to help solve your Fireproofing Problems.

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A Combined Form and Reinforcement

Capital Hotel, Frankfort, Ky., Frank L. Packard, Architect—
Herringbone (Armco) Metal Lath used for suspended ceilings throughout.

Specify Permanent Beauty

INTERIORS are too often marred by the cracking, checking or loosening of plaster. It is unnecessary to run such a risk. Herringbone walls and ceilings maintain their original attractiveness in spite of sudden jars or long continued settling.

The Herringbone mesh curls the plaster behind it, firmly keying every inch of surface without waste. Thus embedded, it forms a rigid fireproof reinforcement. Being rigid, it allows the economy of 25% wider stud spacing. And Herringbone now costs no more than ordinary "Key" lath.

May we send you a copy of the "Fireproofing Handbook," eighth edition? It is replete with useful data of daily value, including many tables, working drawings and photographs.

Other GF Materials

Self-Sentering—A combined form, lath and reinforcement.

Trussit—A reinforcement for solid partitions.

GF Expanded Metal—A concrete reinforcement.

GF Steel Tile—For concrete floors.

GF Steel Lumber—Used in place of wood joists and studs.

GF Steel Channnels—For fireproof partitions and ceilings.

GF Peds—Spot grounds for attaching trim to concrete and plaster.

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Write for illustrated literature.

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